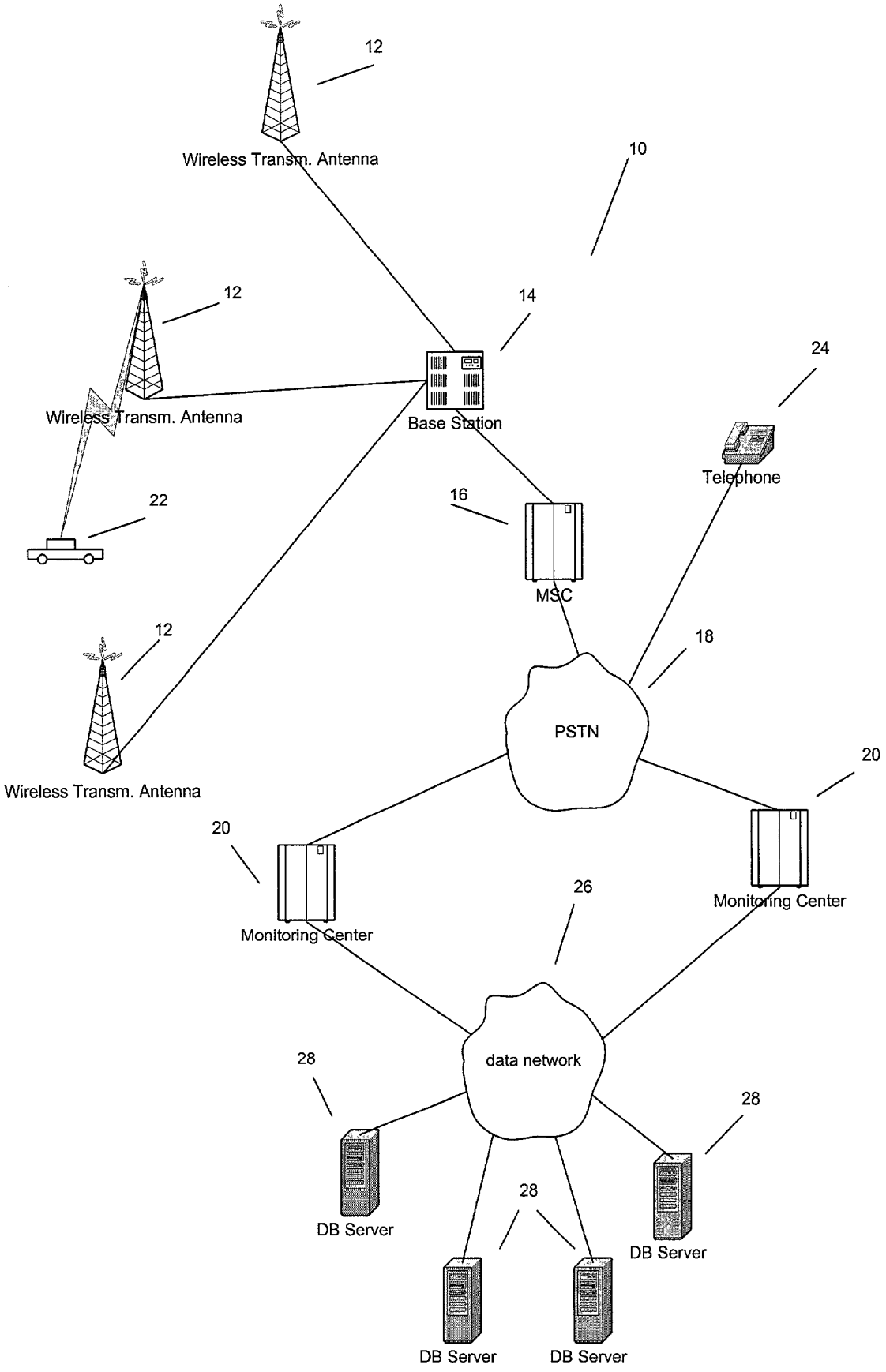

12
Wireless Transm. Antenna
10
12
14
Wireless Transm. Antenna
Base Station
24
Telephone
22
16
MSC
12
18
PSTN
Wireless Transm. Antenna
20
20
Monitoring Center
Monitoring Center
26
data network
28
28
DB Server
28
DB Server
DB Server
DB Server

Figure 1

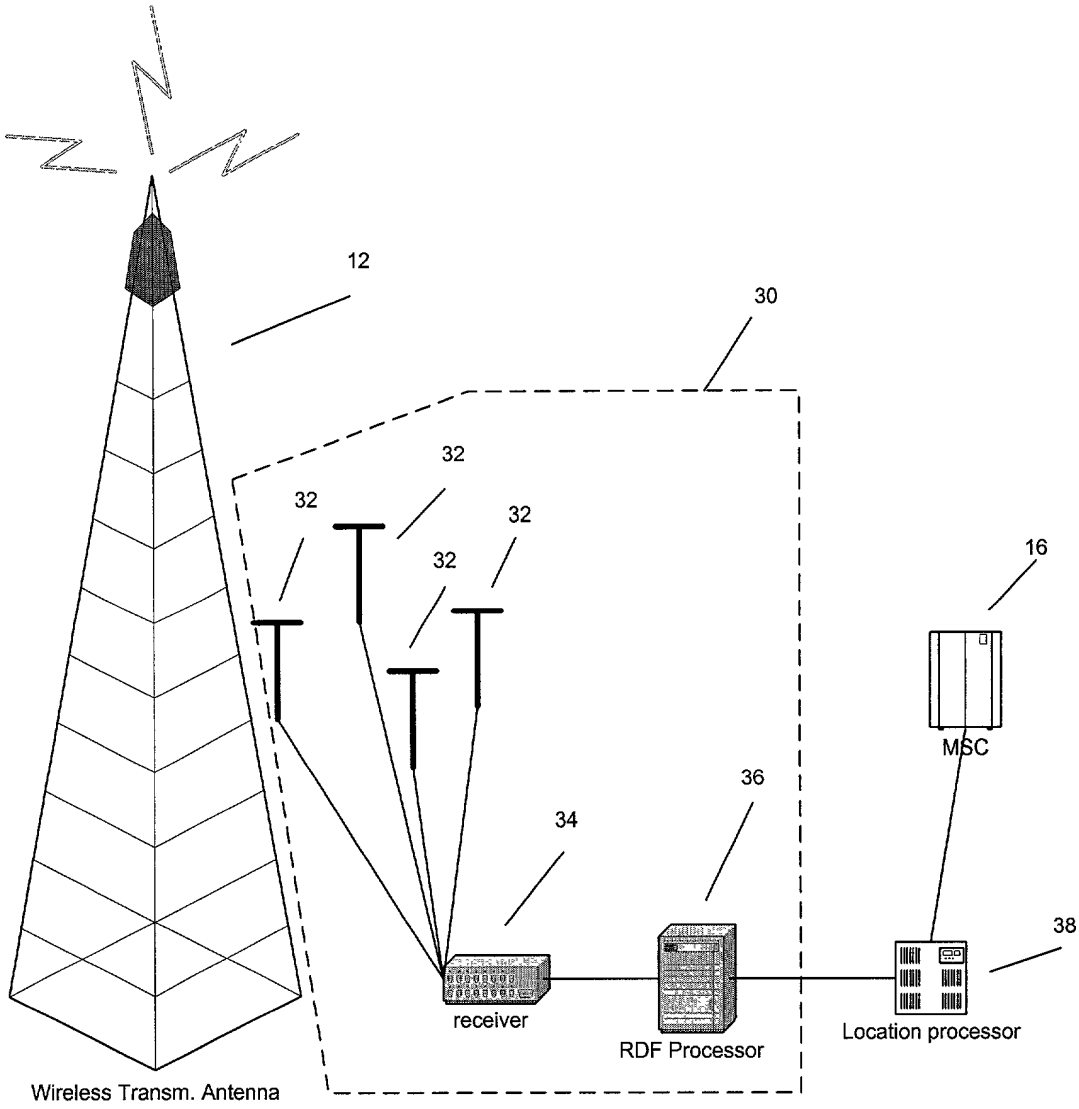

12
30
32
32
32
32
16
MSC
36
34
38
receiver
RDF Processor
Location processor
Wireless Transm. Antenna

Figure 2

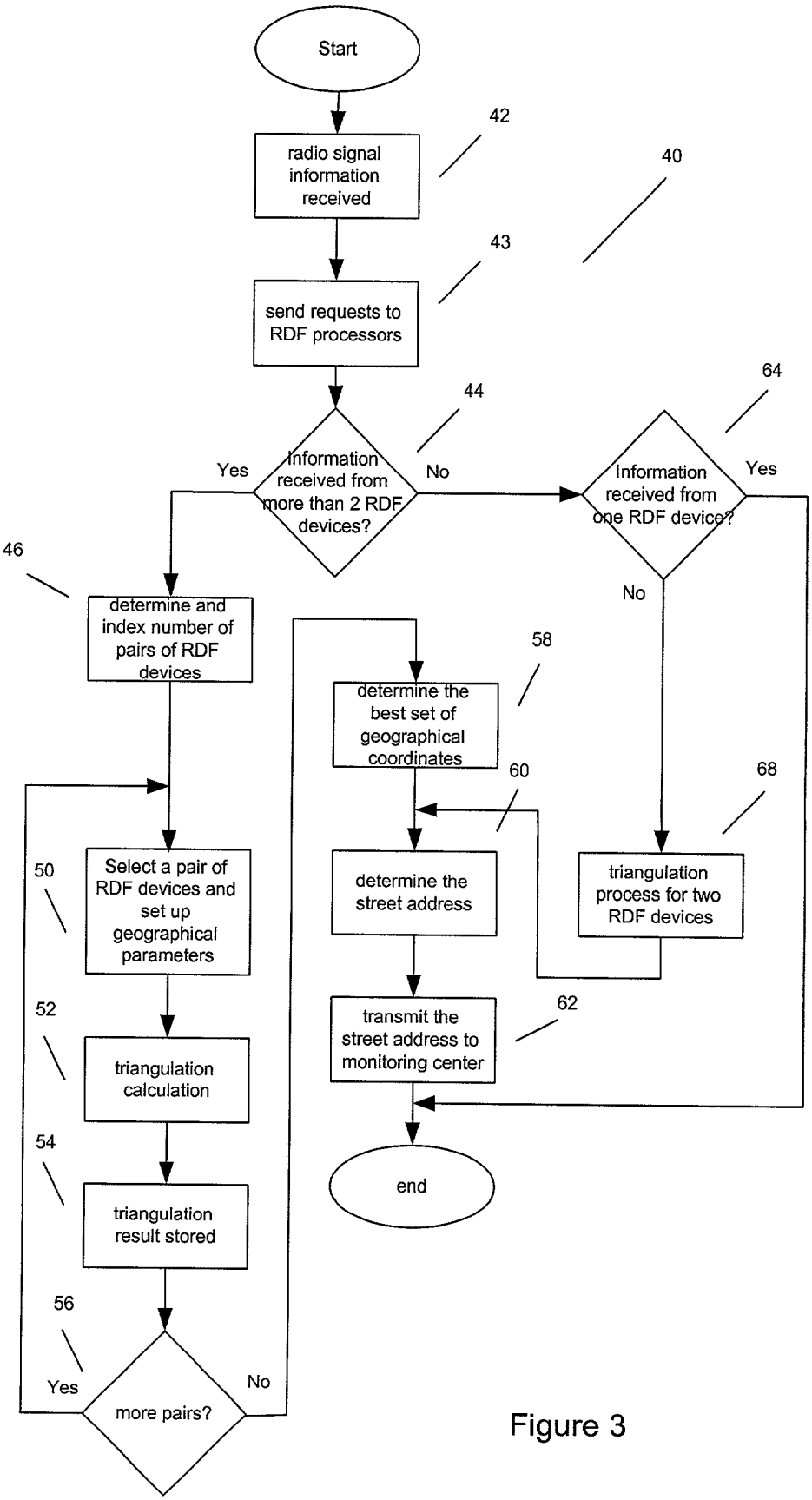

Start
radio signal information received
42
40
send requests to RDF processors
43
Information received from more than 2 RDF devices?
44
Yes
No
Information received from one RDF device?
64
Yes
No
46
determine and index number of pairs of RDF devices
Select a pair of RDF devices and set up geographical parameters
50
triangulation calculation
52
triangulation result stored
54
more pairs?
56
Yes
No
determine the best set of geographical coordinates
58
determine the street address
60
transmit the street address to monitoring center
62
triangulation process for two RDF devices
68
end

Figure 3

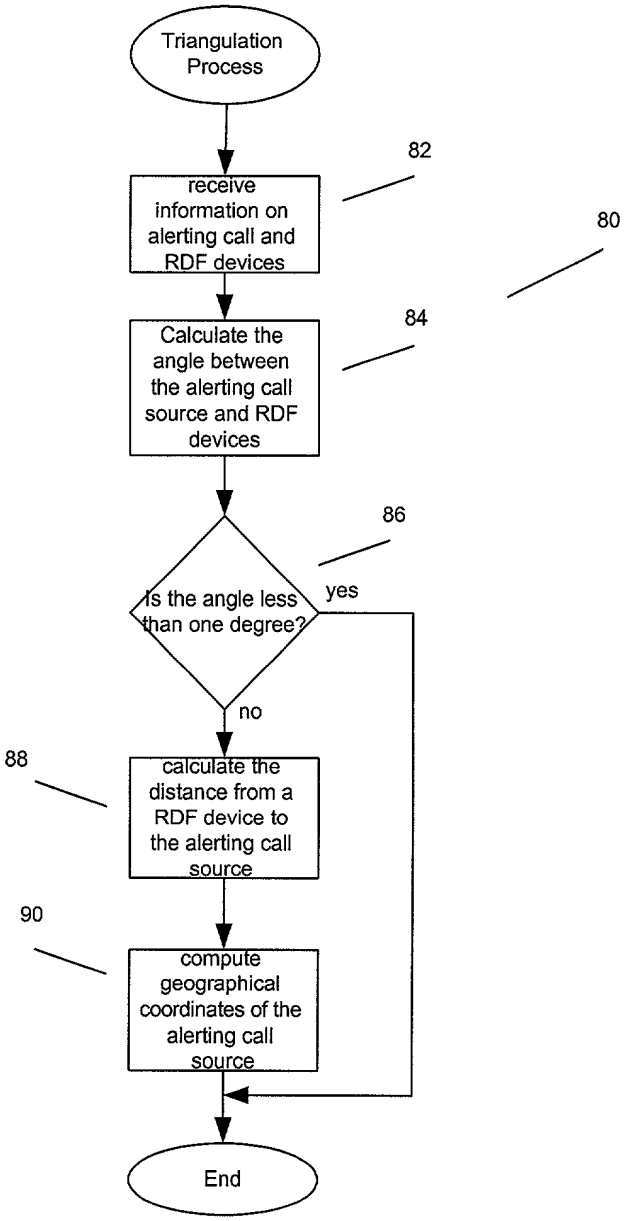
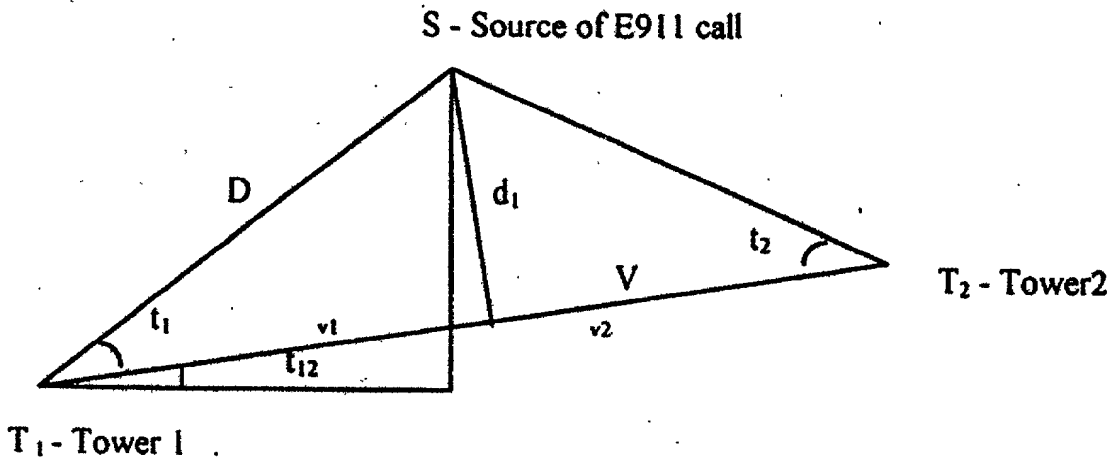

Triangulation Process
82
receive information on alerting call and RDF devices
80
84
Calculate the angle between the alerting call source and RDF devices
86
Is the angle less than one degree?
yes
no
88
calculate the distance from a RDF device to the alerting call source
90
compute geographical coordinates of the alerting call source
End

Figure 4



DEFINITIONS

d_1 is the perpendicular distance from Source, S, to the vector, V, connecting T_1 and T_2
D is the derived distance from S to T_1
V is the length of the vector from T_1 to T_2
v_1 is the distance from T_1 to d_1
t_1 is the angle from S to T_2
t_{12} is the angle at T_1 from the vector, V, to a line representing the Latitude of T_1
t_2 is the angle from S to T_1
V is the sum of v_1 and v_2

$$v_1 = V\,(\text{tangent } t_2) / [(\text{tangent } t_1) + (\text{tangent } t_2)] \quad \text{Equation 1}$$

$$D = v_1 / \cos t_1 \quad \text{Equation 2}$$

$$\text{Source Latitude} = T_1 \text{ Latitude} + D \sin (t_1 + t_{12}) \quad \text{Equation 3}$$

$$\text{Source Longitude} = T_1 \text{ Longitude} + D \cos (t_1 + t_{12}) \quad \text{Equation 4}$$

FIG 5.

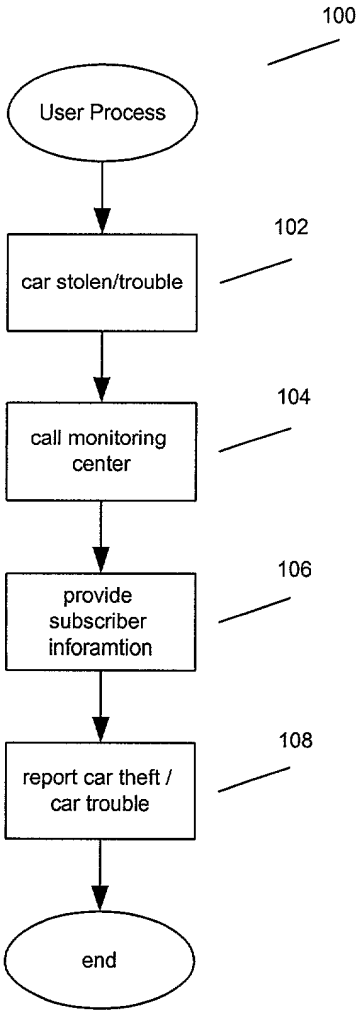


Figure 6

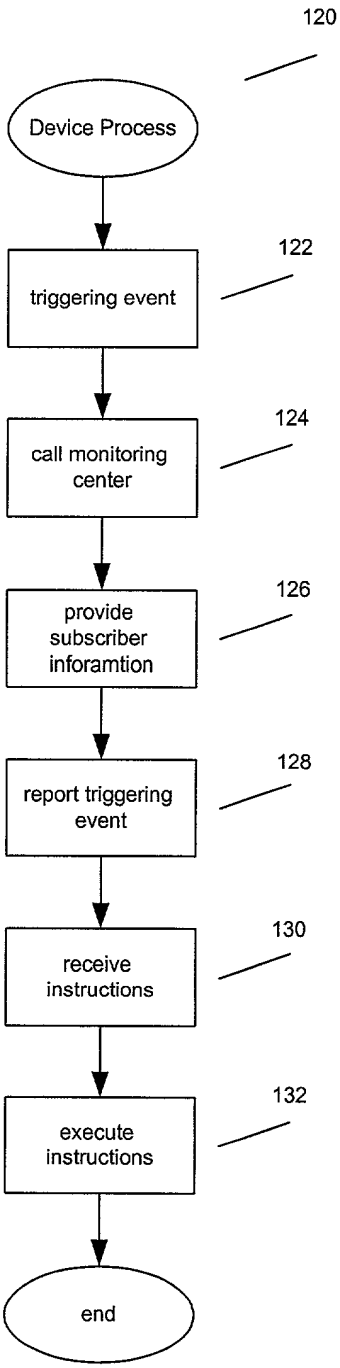


Figure 7

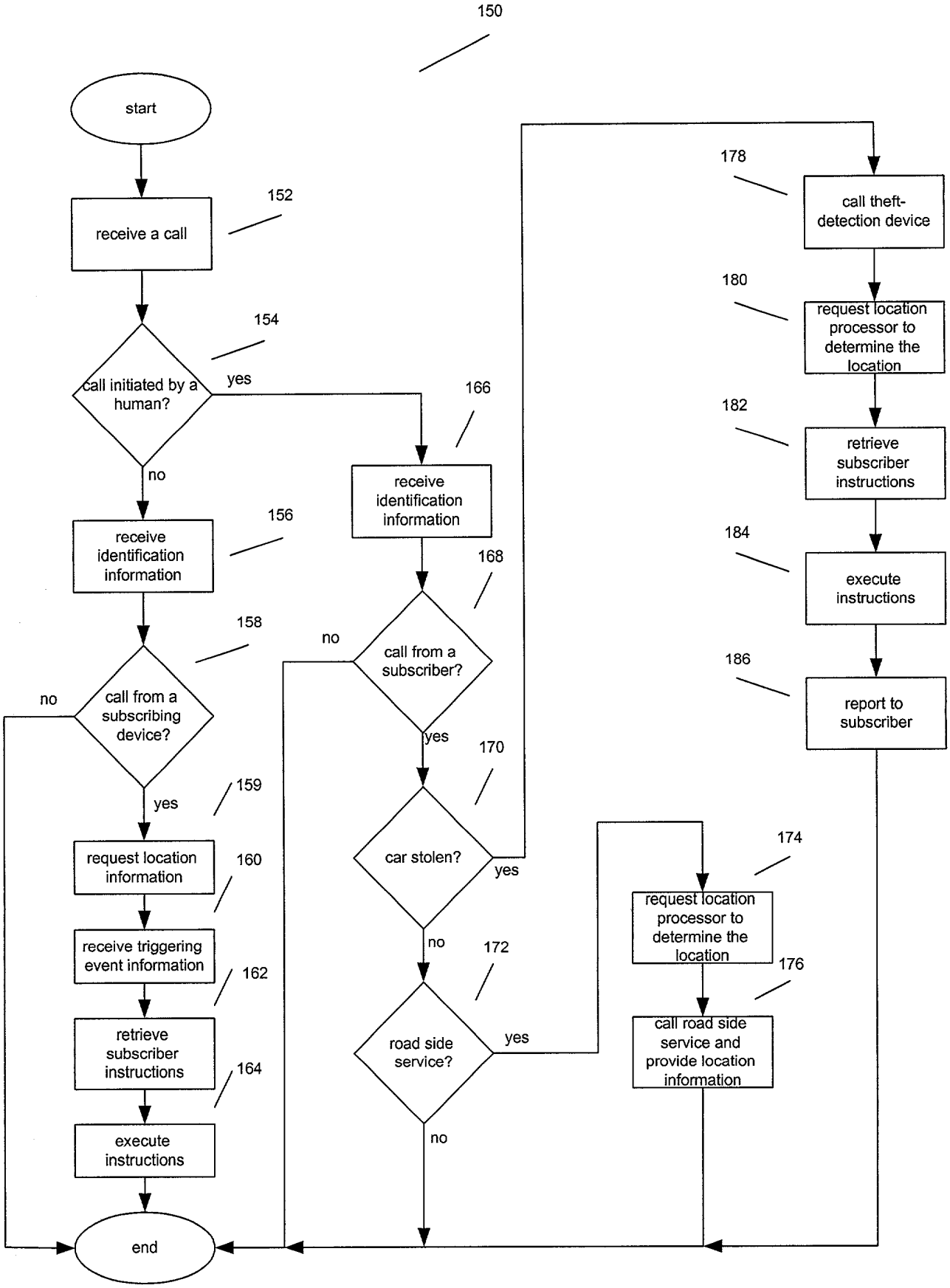

150
start
receive a call
152
call initiated by a human?
154
yes
no
receive identification information
156
call from a subscribing device?
158
no
yes
159
request location information
160
receive triggering event information
162
retrieve subscriber instructions
164
execute instructions
end
166
receive identification information
168
call from a subscriber?
no
yes
170
car stolen?
yes
no
172
road side service?
yes
no
174
request location processor to determine the location
176
call road side service and provide location information
178
call theft-detection device
180
request location processor to determine the location
182
retrieve subscriber instructions
184
execute instructions
186
report to subscriber

Figure 8

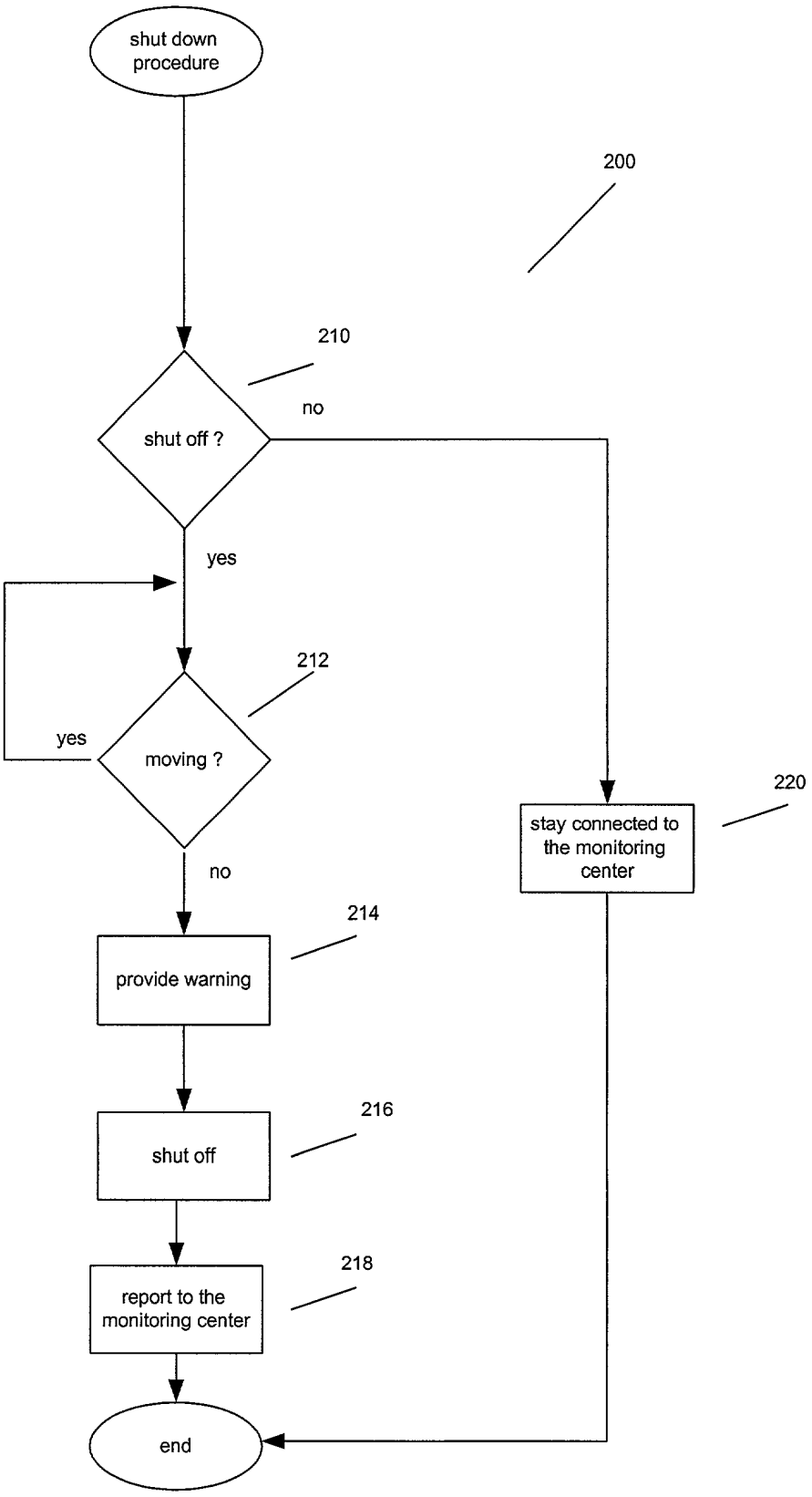

shut down procedure
200
210
shut off ?
no
yes
212
moving ?
yes
no
220
stay connected to the monitoring center
214
provide warning
216
shut off
218
report to the monitoring center
end

Figure 9

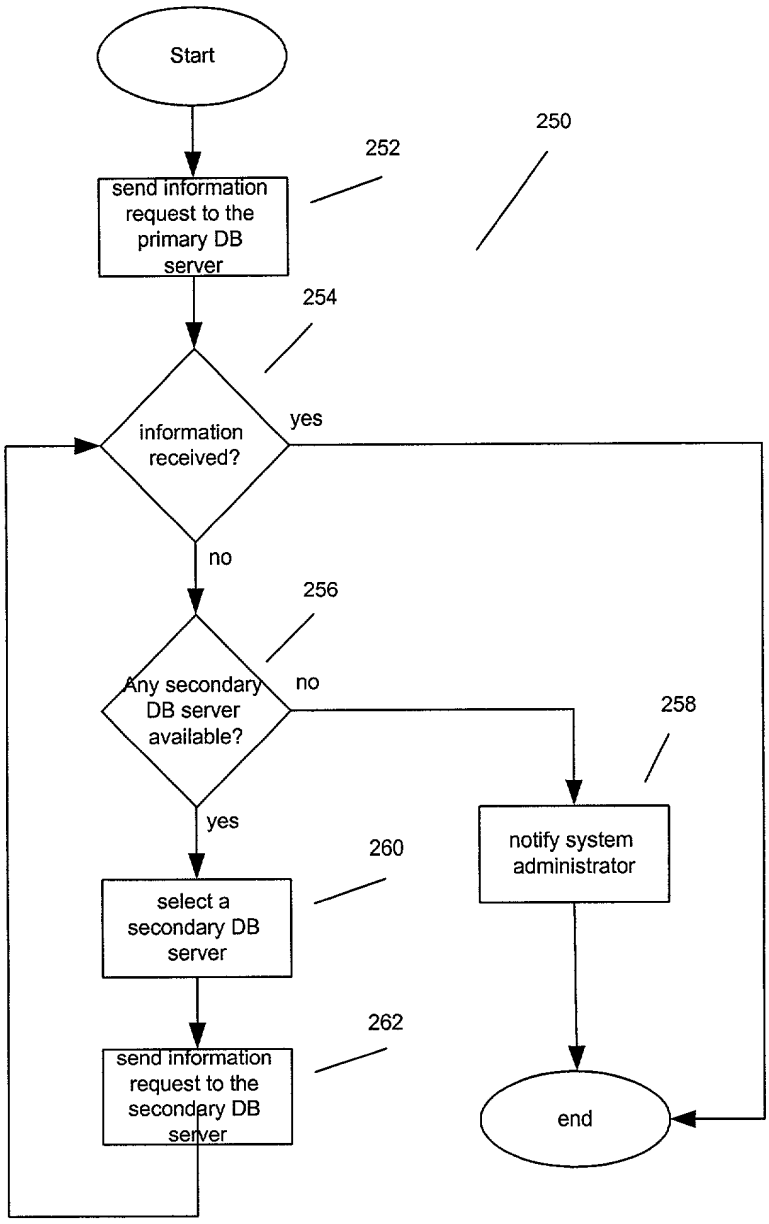

Start
250
252
send information request to the primary DB server
254
information received?
yes
no
256
Any secondary DB server available?
no
258
notify system administrator
yes
260
select a secondary DB server
262
send information request to the secondary DB server
end

Figure 10

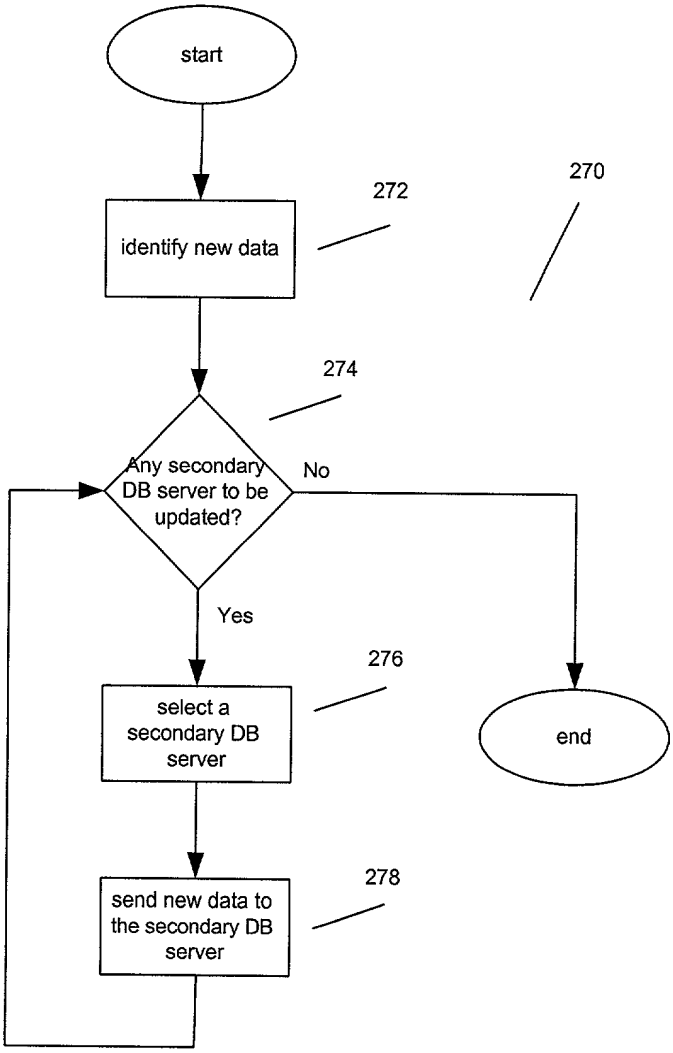

start
identify new data
272
270
274
Any secondary DB server to be updated?
No
Yes
select a secondary DB server
276
end
send new data to the secondary DB server
278

Figure 11